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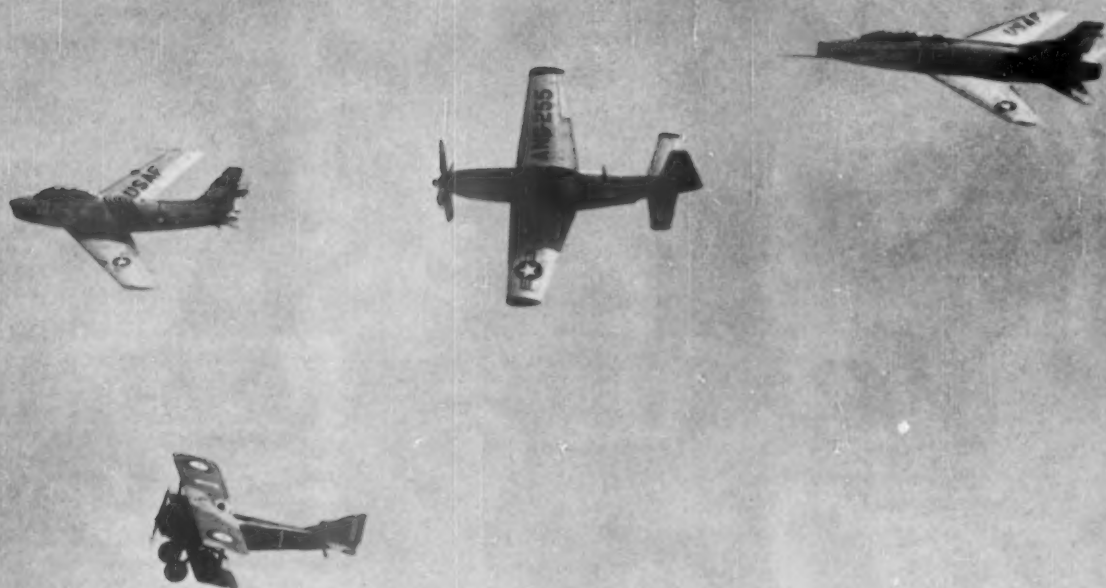
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September 4, 1954

VOL. 66, NO. 19 PAGES 145-160

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Four Generations

See Page 153

A SCIENCE SERVICE PUBLICATION

The  
pole  
that  
need  
not  
be  
climbed



*Fastening wires with new tool.*

Since telephony began, there has been just one way to install telephone wires on poles: have a trained man climb up and fasten them there. Now Bell Telephone Laboratories engineers have developed a special pole line for rural areas. The entire line can be erected without climbing a pole.

The whole job is done from the ground. Light-weight poles are

quickly and easily erected. Newly created tools enable men to fasten wires to crossarms 10 to 25 feet over their heads.

This inexpensive line promises more service in sparsely populated places. From original design to testing, it exemplifies a Bell Telephone Laboratories team operation in widening telephone service and keeping costs down.



*Key to the new "climbless" pole is this insulator. Ground crews use long-handled tools to place the wire in position and then lock it fast.*

## BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in scientific and technical fields



## PUBLIC HEALTH

# Know These Chemicals

Isopropyl methyl phosphonofluoridate and dimethylamido ethoxyl phosphoryl cyanide are two chemicals whose nicknames will become familiar words if war comes.

► IF WAR comes, the average person who has learned such unfamiliar terms as neutron and nuclear fission, thanks to the A- and H-bombs, may be just as much interested in knowing the following.

Isopropyl methyl phosphonofluoridate.  
Dimethylamido ethoxyl phosphoryl cyanide.

These are the chemical names for two nerve gases. The isopropyl job has the short name, sarin. The other has been short-named or nicknamed tabun.

They were once considered for war use by German military authorities. Almost everything about them except the fact of their existence was a closely guarded secret of our military officials during World War II and for some time after.

Now, Drs. Stephen Krop and A. M. Kunkel, civilian scientists with the Army Chemical Corps, report on work done on these nerve gases in 1947 and 1948. The full names and structural formulas are given in their account, to show how they are related to another well known anticholinesterase chemical, DFP.

DFP, short for di-isopropyl fluorophosphate, has been used medically for some years to treat the eye disease, glaucoma, and the muscle weakness disease, myasthenia gravis.

Like the two nerve gases, DFP stops the action of an important body chemical that is essential to the nerves performing their function. Hence the name, nerve gases. The body chemical is the enzyme, cholinesterase, so nerve gases and DFP are called anticholinesterases.

DFP and sarin are alike in that each has a phosphorus and a fluorine atom. Tabun has the phosphorus, but instead of the fluorine, it has a cyanide group in its molecule. DFP has more oxygen and more hydrogen than either sarin or tabun. And tabun has an extra nitrogen atom besides the one in the cyanide.

The effects of these nerve gases have often been given, although their chemistry, even after secrecy was lifted, has been told chiefly to chemists, pharmacologists and other scientists. Drs. Krop and Kunkel sum them up by saying they "exert profound effects on the respiration, circulation, central nervous system and gastrointestinal tract."

In lay language they have been described as follows:

If a high concentration is breathed for a few seconds, death occurs. Exposure even to traces of their vapors causes marked constriction of the pupils of the eyes. The bronchial tubes become constricted, there is sudden difficulty in breathing, accom-

panied by coughing, shortness of breath and watery discharge from the nose.

A slightly greater exposure causes painful constriction of the focusing muscles of the eyes. There is pain when the person afflicted

tries to focus his eyes and often bright light is painful.

Severe exposure causes irrational behavior, hence the reference to nerve gases as "madness gases." There is also emotional instability, depression, restlessness and tremor in such cases. Milder cases of nerve gas poisoning may show such mental symptoms as giddiness, tension, anxiety, insomnia and excessive dreaming.

The report of the 1947-1948 work on them by Drs. Krop and Kunkel is now reaching scientists through the *Proceedings of the Society for Experimental Biology and Medicine* (July).

Science News Letter, September 4, 1954

## PHYSIOLOGY

## Nerve-Gas Resistance

► BULL FROGS show "great resistance to and remarkable recovery from" sarin, the most poisonous of three known nerve gas type compounds.

They can survive more than a thousand times the dose that would kill a man, Dr. Charles G. Wilber of the Chemical Corps Medical Laboratories, Army Chemical Center, Md., reports in *Science* (Aug. 20).

Reason for studying the effect of nerve gases on frogs, he explains, is that a big part of our knowledge of fundamental physiology of nervous activity has come from frogs and similar animals.

Even when he gave a dose of sarin big enough to kill a 150-pound man, two out of six of the frogs survived. Comparing the

size and weight of a frog to that of a man gives an idea of the frog's resistance.

Doses of drugs or other chemicals usually are sized according to the weight of the animal or person. Children, for example, get smaller doses than grown-ups, and guinea pigs or other laboratory test animals get still smaller doses.

To explain the frog's resistance to sarin, Dr. Wilber points out that two key effects of nerve gas poisoning on man and other mammals are paralysis of breathing and great slowing of blood circulation.

In frogs such effects merely act like an anesthetic, putting the animal to sleep, until the poison has been detoxified.

Science News Letter, September 4, 1954



"BLAST OFF"—Instead of the deadly ray of science fiction stories, this operator uses rice hulls and ground walnut shells to blast off surface dirt on General Electric J-47 jet engines returned for overhaul.

## OPTICS

# Human Color Vision

► **YOUR OPTICAL** system for seeing colors works essentially like the mechanics for color television transmission, according to a new theory proposed by a University of California scientist.

Color perception, explains Dr. Gordon L. Walls, professor of physiological optics and optometry, is one of the most baffling aspects of human vision. His theory is the result of years of study of color blindness and color vision.

Most ideas about color perception hold that the eye contains separate receiving elements for color and for brightness.

Dr. Walls' evidence, however, indicates that color and brightness are received by the same elements in the eye but are transmitted to the brain over separate, "branched" pathways. In such an arrangement, brightness messages and color messages can be amplified independently along each one's own pathway.

Color television transmission requires essentially the same separation, independent amplification, and recombination of brightness and color signals as Dr. Walls' "branched pathways" theory would provide in the visual system.

"So it appears," Dr. Walls said, "that millions of years ago, nature found out

that brightness and color messages could not be sent over the same routes and still have everything in proper balance for a perfect picture. Only recently, however, have the television engineers learned that."

Dr. Walls obtained much of his evidence from studies of women who are genetic carriers of color blindness. "Carrier women" theoretically should be normal, but sometimes are color blind in peculiar ways. Thus, for example, impaired brightness vision with no defects in color vision, and vice versa, are found.

Such cases can be explained, the California scientist believes, only by the presence of a branching system and transmission lines to the brain from a single set of color-brightness receiving elements in the eye.

Dr. Walls believes all the main facts of color vision and color blindness appear to fit into the branched pathways theory. Nor has he been able to find a single "special" case of congenital color blindness that cannot be explained on the basis of the theory he now proposes.

The scientist hopes the theory will serve to re-direct studies of color-blindness toward a full understanding of the color vision phenomena.

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logical Observatory, Palisades, N. Y., where it was sprinkled by radioactive debris from an atomic bomb in Nevada, blown skyhigh and wafted across the continent.

Unaware of the contamination, Columbia reported to Prof. Bert A. Gerow of Stanford the 2,000-year age, which did not fit in well with the fact that they were in a lower earth layer than specimens believed to be over 2,000 years old. A retest showed the older age.

Dating by radiocarbon tells age by dying out of the radioactivity of the element carbon, formed by cosmic rays out of the upper air's nitrogen and incorporated in living things through the carbon dioxide of the air.

Science News Letter, September 4, 1954

## SCIENCE NEWS LETTER

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## PEDIATRICS

# Nursery School Helpful

► **SCHOOL WILL** soon be starting and even the five-year-old of the family will be off to kindergarten. In many homes, this leaves little sister or brother, aged two or three, home alone all morning or all day with no playmate except busy mother.

This child will feel both lonely and unhappy at being left out. Too often he waits all morning for big brother or sister to come back and play with him, only to find big brother or sister now wants to play with school mates and older children exclusively.

For the child in such circumstances, nursery school may be the answer, just as it often is for the only child and the child whose mother works out all day.

Some children at nursery school will learn to use crayons and paste, scissors and clay. But the chief thing they are likely to learn is how to get along with others, how to play and have fun as part of a group. This learning to be sociable is an important lesson for every child.

Youngsters in a large family with plenty of children at home and in the neighborhood may learn it without going to nursery school. Some mothers have the knack of making the back yard or the child's own room into an informal nursery school for the whole neighborhood.

If, however, you decide to send your small child to a nursery school, select one care-

fully. Visit it, preferably while it is in session. See whether it is clean and whether there are plenty of toys and play supplies and space to play.

Watch the children to see whether they look happy or whether they are scared and overly-quiet. Watch the teachers and talk to them to learn whether they seem to love and enjoy the children and have a way with them.

Check on whether the teachers have had real training for their jobs, and on how many children there are to each teacher. More than eight or 10 under-five-year-olds are hard for one person to handle, as any mother knows herself.

Science News Letter, September 4, 1954

## PHYSICS

## A-Bomb Debris Confuses Dating

► **ATOM BOMBS** are musing up the radioactive dating of the recent past. As a consequence, ancient Indian burials unearthed during building operations at University Village near Stanford University, Calif., are about 3,000 years old instead of 2,000 first reported.

Charcoal from the prehistoric graves was sent to Columbia University's Lamont Geo-



## PUBLIC HEALTH

# Mental Illness Cause

**Veterinarian discovers that many cases of mental disease where cause was considered obscure may be result of long-previous contact with nerve-loving virus.**

► A NEW field of research in human mental disease is opening as a result of findings by a veterinarian, Dr. J. S. Fulton of the University of Saskatchewan, Canada, the American Veterinary Medical Association was told at its meeting in Seattle.

Workers in this new field will be searching for nerve-loving viruses that may have unsuspectedly twisted human minds and emotions.

Clue to this possible new basis for many cases of mental disease of obscure cause came from studies of western equine encephalomyelitis, or so-called horse sleeping sickness.

Soon after the first outbreak of this virus-caused disease occurred among horses in Saskatchewan, back in 1935, a number of humans contracted a disease of the central nervous system that was at first thought to be non-paralytic poliomyelitis, Dr. Fulton said.

As the years rolled by, more cases of this sickness developed in humans even when there was no polio. Then Dr. Fulton and associates succeeded in finding the horse disease virus in the blood of one human patient and the brain of another. For over a decade, humans and horses continued to be attacked by the virus.

The link with mental sickness came when Dr. Fulton and associates were asked by physicians to make tests for the virus on blood from a child suspected of having a brain tumor. The test proved positive and, checking back over the records, Dr. Fulton found the child was one of those who had the horse sleeping sickness some years before.

Then a check was made to see whether any of the other children and grown-ups who had been attacked by the horse disease virus, called W.E.E. for short, had later developed mental changes. "A good many, it was found, had and some had been sent to mental hospitals.

Because some cases of W.E.E. are so mild they might be confused with less serious illnesses, the mental changes coming later, Dr. Fulton and associates thought it would be worth while to test patients in Saskatchewan's mental hospitals. This was done and of 2,305 tested, 35 were found to have had W.E.E. previously. And all patients who had been in mental hospitals before the horse sleeping sickness appeared in Saskatchewan gave negative tests for the virus.

Since these findings, doctors at one of the mental hospitals have been classifying the patients on the basis of their having had or not having had W.E.E. virus infection. The work is still going on, but al-

ready it shows that the majority who had been attacked by the virus suffer from a mental disorder that has kept the doctors wondering about the cause.

These doctors on the mental hospital staff, Dr. Fulton reported, believe that tests for nerve-loving viruses should be made in all cases where the cause of mental change is obscure.

Science News Letter, September 4, 1954

## MEDICINE

## More Identical Twins Needed for MS Study

► THANKS TO cooperation of hundreds of newspaper and magazine editors, the National Multiple Sclerosis Society has now located some 35 pairs of identical twins in 19 states who are afflicted with MS, or multiple sclerosis. (See SNL, July 17, p. 41.)

The twins will take part in a study designed to show whether or not there are hereditary or environmental causes of the disease. Ideal twins for the study would be those pairs of identical twins of which one has the disease and the other has not.

Since identical twins develop from the same egg cell, or ovum, the hereditary background would be identical. Differences in environmental factors would then be searched for possible causes of the disease in the one twin and not the other.

While the first 35 pairs of twins are being processed to make sure they are identical and that one or both has MS, the society is continuing its appeal for more MS twins.

Science News Letter, September 4, 1954

## PLANT PATHOLOGY

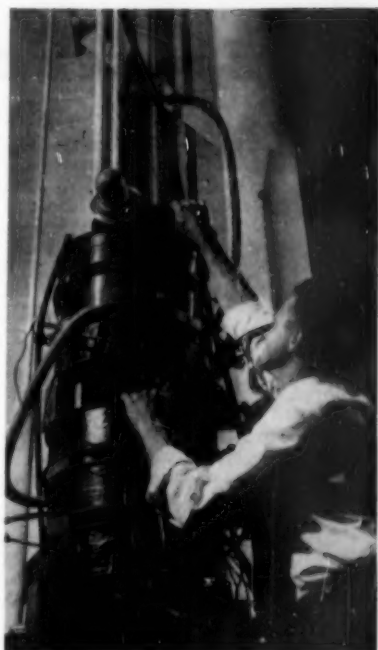
## Asparagus Rescued From Fungus Wilt Disease

► ASPARAGUS MAY be rescued from a widespread wilt disease through the discovery of resistant seedlings reported to the American Phytopathological Society meeting in Estes Park, Colo., by R. G. Grogan and Kenneth Kimble of the University of California.

Asparagus fields seem to "run out" after reaching top production. This is due to a fungus disease, Fusarium wilt. Out of thousands of seedlings examined, 23 have been found to withstand inoculation with the disease. These will be used to develop a new resistant strain.

Chemical treatment of the seed with lignan also controls the disease.

Science News Letter, September 4, 1954



**GIANT KLYSTRON**—First photo of the 4,000,000-watt klystron designed to power an advanced Air Force radar. The eight-foot giant, prototype for a series of the military's most powerful microwave tubes, is shown undergoing installation in a high-power radar transmitter room at Griffiss Air Force Base, N. Y.

## ELECTRONICS

## Giant Tube Now Ready for Radar Use

► DEVELOPMENT OF a giant electronic tube that paves the way for super-radars reaching far beyond present limits has been announced by the U.S. Air Force.

Known as a megawatt klystron, the tube is eight feet tall. It is the first to produce millions of watts of precisely controlled radar power for military systems as yet undisclosed.

In secret tests more than five years ago, the super-power klystron, driven by 140,000 volts, broke the "electron-barrier" that once limited the performance of radars essential to military weapons of the future.

Experimental proof of a new "electron-packing" technique came from basic klystron research of the Sperry Gyroscope Company, Lake Success, N. Y.

Military value of this discovery imposed immediate security wraps, ahead of later developments for television and other commercial uses, medical research and nuclear study.

Science News Letter, September 4, 1954

## PSYCHOLOGY

# Chronic Female Gamblers

► IF YOU picture the woman who plays poker in a gambling club a large part of her time as a maladjusted neurotic with a blind and unreasonable faith in Lady Luck, you will get a surprise from a scientific study of such women conducted by William H. McGlothlin as a graduate student at the University of Southern California.

The woman who haunts the gaming table is actually better adjusted socially, emotionally, and at home than is the average woman.

This result is based on a study of 31 women picked pretty much at random from the patrons of commercial card clubs at Gardena and Seal Beach, California. The women studied have an average age of 37 years. They play, on the average, 2.7 times a week, and their sessions last about five hours each.

The longest time any of them had put in at the poker table at one time was 48 hours, but 13 of the women had put in more than 18 hours in a session at least once.

Why do the women gamble so much? It is evidently not through any mistaken idea that they are making easy money from it. Most of the women say that they are fully aware that they lose more than half of the time and have been doing so for a number of years.

"It is quite possible," Mr. McGlothlin suggests in the *Journal of Consulting Psy-*

*chology* (April) "that it (playing poker) may contribute to good adjustment by combating boredom. In our society, many middle-aged women find that time weighs heavily on their hands, and the resulting boredom is often a contributing factor to conflicts in various facets of their lives.

"To the extent that the game of poker offers a stimulating activity to occupy the participant's time and interest, it may well be an adjunctive factor."

A test rating belief in luck and superstition was taken by the 31 women. Those scoring high, it was found, did not tend to take more risks in the poker game or lose more often than those who relied more on their skill than blind luck.

Neither did those who received bad scores on adjustment tests tend to take more risks or lose more often than better adjusted women. However, it was found that those who are relatively poorly adjusted have the most faith in luck and superstition.

When a woman becomes completely immersed in an activity, whether it is a job, bridge, golf or poker, to the point where she is willing to spend all or a large portion of her available time at it, it is not surprising that she should have a minimum of worries, is not irritated by the people at home, and in general shows superior adjustment, Mr. McGlothlin concludes.

*Science News Letter, September 4, 1954*

## PUBLIC HEALTH

# Atomic Sterilization

► IONIZING RADIATION, such as comes from A-bombs, atomic reactors and fission products, will be used to sterilize drugs before it is used for sterilizing foods.

The reason is cost. The initial capital cost will be large for this method of sterilization, whether for food or for drugs. However, projected costs of such sterilization of penicillin promise to be much less than the costs of sterilizing the famous mold remedy by present methods.

This was pointed out by Maj. U. S. Grant Kuhn, US Air Force, and Lt. Col. Bernard F. Trum and Lt. Col. John H. Rust, both of the Army, in a report to the American Veterinary Medical Association meeting in Seattle. The three officers of the Armed Forces veterinary corps are attached to the agricultural research program being carried on by the University of Tennessee and the Atomic Energy Commission at Oak Ridge, Tenn.

Besides cost, other factors holding up commercial use of ionizing radiation for food sterilization are the need for further knowledge of possible toxic effects, the availability of suitable amounts of fission products to do the job, and the development

of methods to overcome undesirable flavor changes in the irradiated foods.

Most immediate practical application of the process, the three officers said, would seem to be pasteurization of dairy products, increasing shelf-life of certain foods without completely sterilizing them, and destruction of parasites and insects in foods.

The advantage of ionizing radiation for food sterilization lies in its ability to kill germs without raising temperatures appreciably. Fresh meats, fruits and vegetables could be prepackaged and then sterilized, and they would then have a long shelf-life without need for refrigeration. Dried whole eggs might also be treated by this process and then stored.

Some of the problems, however, come from the fact that apparently the germs, or microorganisms, in food are affected by direct hits of radiation. That is, either a particle or a quantum of radiation must pass through every cell or very near to it.

"This," the officers said, "is much like trying to shoot minnows in a rain barrel with a BB gun. It takes a lot of BB's. It takes a lot of radiation, too, to kill all the microorganisms."

For example, while 99.1% of germs in a suspension were killed by 71,000 rep of gamma radiation from radioactive cobalt 60, it took more than four times that amount, 289,000 rep, to kill 100% of the germs. An rep, or roentgen equivalent physical, is a unit of measure for radiation.

*Science News Letter, September 4, 1954*

## NEUROPHYSIOLOGY

# Seat of Emotions In Brain Discovered

► THE SEAT of the emotions in the brain has been discovered.

It is the brain spot that makes you feel scared if someone sticks a gun in your back. If you are lying quietly in bed and a doctor, unknown to you, touched this part of your brain with an electric current, you might feel as scared as if a wild lion were charging at you.

This brain center is also the seat of feeling of pain, and presumably of other, pleasanter feelings.

Its discovery has been announced by Drs. Jose M. R. Delgado, Neil E. Miller and Warren W. Roberts of Yale University, New Haven, Conn.

This seat of the emotions is located in the lower part of the brain. The Yale scientists find they can arouse emotions by electrically stimulating the hippocampal gyrus or the lateral nucleus of the thalamus, both in the lower part of the brain.

Since discovering this seat of the emotions, animals have for the first time been motivated to learn habits by electrical stimulation of the brain.

In one experiment, electrical stimulation of the emotion center in a cat's brain caused a temporary emotional disturbance so that the cat learned to fear a white box it previously had preferred and to jump from the white box into a black one. As long as three weeks later, the cat still feared the white box.

In other experiments, electrical stimulation of the emotion center in the brain caused hungry cats to learn to control their appetites and avoid food.

*Science News Letter, September 4, 1954*

## VETERINARY MEDICINE

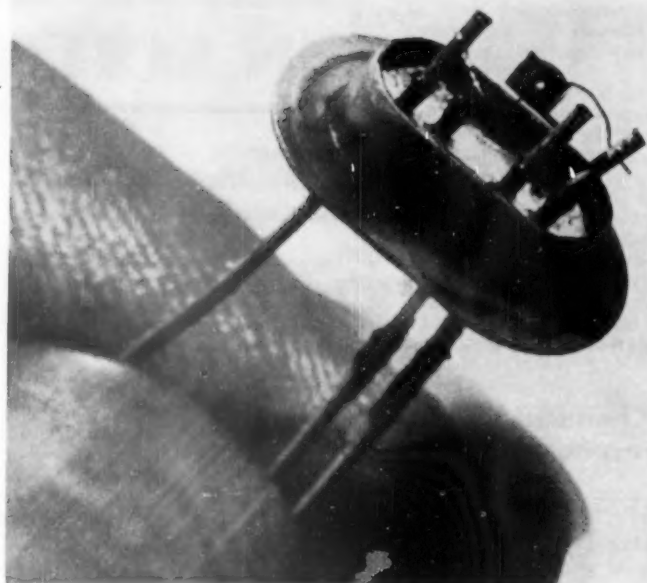
# Synthetic Hormone Helps Cut Meat Cost in Half

► COST OF producing meat can be cut in half by giving food animals shots of a synthetic female hormone, stilbestrol, and feed supplements.

Tests showing this were reported by Dr. Loyal C. Payne of Iowa State College to the American Veterinary Medical Association meeting in Seattle.

"One large beef producer contends the cost of meat production may be lowered as much as eight cents a pound, bringing it to about half the present cost, under such a program," said Dr. Payne.

*Science News Letter, September 4, 1954*



**TRANSISTOR FOR AMPLIFICATION**—This new ultra-high-frequency transistor can increase an original electrical impulse a thousand-fold when used as an amplifier. To date, frequencies as high as 440,000,000 cycles per second have been generated, about four times that of any comparable transistor. Scientists at Bell Telephone Laboratories foresee use of the device in the family TV set and portable radio sets.

## ELECTRONICS

## Electronic Golf Device

► **PRESIDENT EISENHOWER** is using an electronic device especially designed for him by a California scientist to practice his golf, *SCIENCE SERVICE* has learned.

It is probably the reason why the President's golf scores are no longer mentioned only in whispers as they were until recently, but are now sometimes revealed by friends who have played with him.

Exactly how the machine works has not been detailed. It does have flashing lights, but they show only that the device is operating properly. It does not have red and green flashing lights to tell about the President's stroke, as some versions of the 19th hole telling indicate.

The electronic gadget does, however, inform the President exactly what was wrong with a practice stroke, or that his swing that time was perfect.

The machine also tells the President how far the ball would have gone. It does this by timing the speed of the club head at the moment of impact. Since this speed determines the distance the ball would have gone, the length of the drive can be calculated.

As all golfers know, a sweet swing gives a drive straight down the fairway. By watching electronically as President Eisenhower swings at a golf ball, the machine can tell like whether the ball would have

hooked or sliced, whether his shoulders were in the proper position, whether his left arm remained straight throughout the swing, whether he would have hit the ball in the center of the club's face, or would have made one of the many slips that can land a ball in the rough.

When Dr. Luis Alvarez, a physics professor at the University of California at Berkeley and himself a golfer, learned that President Eisenhower played golf, he devised the electronic gadget and presented it to the President.

It is the only gadget of its kind in existence, but demand by other golfers for a like machine is expected to be heavy. It is understood that patent attorneys are preparing to file patent applications on the device. Its use by the President has been a carefully guarded secret. Dr. Alvarez has declined to reveal any details concerning how the device works.

Building a similar machine to help tennis enthusiasts improve their strokes would probably require an electronic computer to do the necessary calculations, since a tennis ball is in constant motion.

*Science News Letter, September 4, 1954*

When relieved of insects, cattle on the average are 50 pounds heavier and have 15% to 20% greater milk yields.

## MEDICINE

## Blood Pressure Cuff Detects Phlebitis Early

► **PHLEBITIS**, FORERUNNER of an often fatal clot on the lung, can be detected early by a simple test announced by Dr. Robert I. Lowenberg of New Haven, Conn., in the *Journal of the American Medical Association* (Aug. 28).

The test is made with the instrument doctors use to take blood pressure. The pneumatic cuff of this instrument is wrapped around the calf or thigh, instead of the arm, and is slowly distended. If the patient has phlebitis, he will "complain bitterly of pain" when the instrument registers between 60 and 150 mm of mercury.

Normally, patients do not register discomfort below 180 over the thigh or calf, and most can stand 250 on the arm without complaint.

Patients continue to die of pulmonary embolism, the sudden blocking of a lung artery popularly called clot on the lung, in spite of various modern medicines, getting patients out of bed soon after operations and childbirth, and habitual close watch by doctors and interns, Dr. Lowenberg points out.

In a high percentage of the fatal cases, the phlebitis, or vein inflammation, and the clot in a vein were not suspected. The new test, he says, will show up the trouble in such cases and doctors can then take steps to prevent a fatal outcome.

False positive tests may occur at times, but in some 350 patients, Dr. Lowenberg has not had any false negative tests. No patient who had a negative test developed thrombophlebitis or pulmonary embolism.

*Science News Letter, September 4, 1954*

## PLANT PATHOLOGY

## Plant Ills Conquered Reported at Meeting

► **PLANT DISEASE** fighters heard about these advances at the American Phytopathological Society meeting in Estes Park, Colo.

Sunburn is a necessary prelude to California's Persian walnut trees being infected by branch wilt disease, Noel E. Sommer of the University of California reported.

Golden Cross Bantam sweet corn in Idaho has a new disease, a mosaic virus that probably lurks in the green foxtail plant, A. W. Finley of the Idaho Agricultural Experiment Station announced.

Cracks in oak tree bark caused by growth of oak wilt fungus allow insects to enter and spread this devastating disease, B. Esther Struckmeyer, J. E. Kuntz and A. J. Riker of the University of Wisconsin have discovered.

Keeping qualities of grapes in cold storage can be predicted by testing small samples for decay, after fumigation, under ideal conditions, John M. Harvey of the U.S. Department of Agriculture station at Fresno, Calif., reported.

*Science News Letter, September 4, 1954*

## ENTOMOLOGY

**Flies Resist DDT by Making Own Antidote**

► **THE SECRET** of how flies have become resistant to DDT and other modern insecticides has been discovered by Dr. Clyde W. Kearns and co-workers at the University of Illinois.

The flies make their own antidote to DDT and presumably to other insecticides. They do it by developing enzyme chemicals. One called DDT-dehydrochlorinase changes DDT to the nontoxic compound, DDE.

This enzyme antidote is specific for DDT. Flies apparently produce another enzyme antidote for other insecticides such as chlordane.

From a million or more flies, Dr. Kearns and associates were able to get enough of the anti-DDT stuff to study it. They hope to purify it, find out the precise mechanism of the DDT detoxifying process and then, presumably, find a way to circumvent the antidotal enzyme.

These findings apparently are not expected very soon. A \$75,000 Rockefeller Foundation grant to aid the research runs for a five-year period.

Science News Letter, September 4, 1954

## TECHNOLOGY

**Cotton Acrylonitrile To Become Plastic Fiber**

► **COTTON MAY** itself become a plastic fiber to challenge the market synthetic fibers are taking from the natural textile material.

In a new experimental operation being started in Texas City, Texas, by the Monsanto Chemical Co., cotton will be married to its commercial rival, acrylonitrile, author of synthetic rubber and intermediate in the production of certain plastics.

Joined with acrylonitrile, cotton will excel in the more rugged qualities, strength, resistance to mildew, weatherproof advantage over the ordinary materials for tents, awnings and tarpaulins. Increased ability to take dyes should brighten up the work-day uses for the modified cotton that will result from the new process.

Clothing is not expected to be affected by the new acrylonitrile process for the present, although waterproofing and wrinkle-proofing methods now in use are said to combine well with the new chemical treatment.

Acrylonitrile, a chemical manufactured in liquid form, is the basis for at least three fibers now used for clothing. The trade names of these fibers are Orlon, Dynel and Acrilan. They are made by processes similar to those used in manufacturing plastics, and are more like wool than like cotton when woven into textile fabrics.

Modification of cotton to help this staple agricultural resource meet competition from synthetic fibers and to improve on cotton's own valuable qualities has been for many

years an aim of one research program at the U. S. Department of Agriculture's Southern Regional Research Laboratories, New Orleans.

Treatment with acrylonitrile is among the chemical processes investigated by chemists there, as one of the methods of improving the old successful mercerization treatment.

As a result of a conference on chemical finishing of cotton, held by the National Cotton Council of America, opportunities for making new and different fibers from cotton were said to be "almost unlimited, and one advantage of the effect of chemical finishing is that of permanency."

Science News Letter, September 4, 1954

## BIOCHEMISTRY

**Thyroid Chemical Five Times More Potent**

► **PATIENTS WITH** under-active thyroid glands can now be given a chemical remedy five times more powerful than thyroxine, the thyroid gland hormone previously used to treat such patients.

The new chemical is called triiodothyronine. It is apparently the form of the thyroid hormone that enters and acts on the body cells, while thyroxine is the form of the thyroid hormone while it is in the blood.

Triiodothyronine was discovered in human blood by Dr. Jack Gross of the State University of New York College of Medicine in Brooklyn.

Together with Dr. R. Pitt-Rivers at the National Institute for Medical Research, London, England, he isolated triiodothyronine from the thyroid of cattle, explored its physiological properties and synthesized it chemically, making it possible to test its effects on the body.

For his discovery, Dr. Gross received the 1954 \$1,000 Chilean Iodine Educational Bureau Award at a meeting in Boston of the American Pharmaceutical Association, which administers the award.

Science News Letter, September 4, 1954

## GENERAL SCIENCE

**Kinsey Sex Studies Have Non-Rockefeller Support**

► **DR. ALFRED** Kinsey of Indiana University, famed for his studies of sexual behavior in the human male and female, is "now in a position to obtain support from other sources" than the Rockefeller Foundation, Dean Rusk, president of the foundation and of the General Education Board has announced.

The foundation has made a new grant of \$150,000 for a three-year period for further support of the Committee for Research in Problems of Sex of the National Research Council. It was through this committee, founded in 1921, that Dr. Kinsey originally obtained substantial support for his studies.

Science News Letter, September 4, 1954

**IN SCIENCE**

## VETERINARY MEDICINE

**Humans Menace Health Of Animals in Zoos**

► **VISITORS MAY** be afraid of the lions, gorillas and snakes when they visit the zoo, but they are a greater danger to the zoo animals than the animals are to the visitors, the American Veterinary Medical Association announced at its meeting in Seattle.

"Primates (apes, monkeys, etc.) have little or no resistance to tuberculosis, and, therefore, should be protected from visitors by glass," the AVMA committee on diseases of wild animals reported. The findings came from a statistical compilation of causes of deaths in various zoos.

The committee said that routine quarantine and tuberculin testing of newly acquired primates have greatly reduced the prevalence of tuberculosis in zoo collections. Deaths among captive animals of the feline species (cats, tigers, lions) which formerly resulted from panleukopenia can be prevented by inoculations, the committee reported.

Foxes, wolves, hyenas, raccoons and other wild animals susceptible to distemper are also being protected by modern vaccination.

Above all, the committee said, "improved nutritional standards have resulted in healthier animals which are less susceptible to disease."

Science News Letter, September 4, 1954

## VETERINARY MEDICINE

**Cortisone Helps Sick Cats, Dogs and Horses**

► **CORTISONE,** FAMOUS gland hormone that has brought relief to thousands of pain-racked bed-ridden arthritis patients, can bring the same relief to dogs, horses and cats afflicted with arthritis.

A six-year-old boxer with such stiff arthritic joints it could not climb was able to run upstairs after one week of cortisone treatment, Dr. John E. Martin of the University of Pennsylvania School of Veterinary Medicine, Philadelphia, reported to the American Veterinary Medical Association meeting in Seattle.

The boxer was only one of many animals helped by cortisone in tests by Dr. Martin and his associates, Drs. Walter E. LaGrange, Frank G. Fielder, Joseph F. Skelley and Maurice W. Arnold.

Besides helping animals with arthritis, cortisone proved effective treatment for otitis externa, an ear infection of dogs, and for skin irritations in dogs and cats, wounds and infection in livestock and acute laryngitis in horses.

Science News Letter, September 4, 1954



# CE FIELDS

## PLANT PATHOLOGY

### Antibiotics Cure Blight Of Pear and Apple Trees

► FRUIT TREES are being protected from the plague of fire blight by antibiotic sprays, the American Phytopathological Society meeting in Estes Park, Colo., was told by John C. Dunegan, plant pathologist of the U.S. Department of Agriculture.

In the first successful, large-scale commercial orchard trial of sprays of mixtures of Terramycin and streptomycin, 98% control of fire blight was obtained in controlled tests at Marysville, Calif.

Fire blight causes annual losses of \$70,000,000 and has destroyed pear growing east of the Mississippi. It has made inroads on commercial apple production.

These antibiotics are also being used on hitherto uncured bacterial diseases of tomatoes, peppers, beans, walnuts and potatoes.

Science News Letter, September 4, 1954

## PHYSIOLOGY

### Heart Force Measured Using Suspension Bed

► A LIGHT-WEIGHT suspension bed is now ready to help doctors measure the strength of the human heart.

At present it is being used by the Air Research and Development Command, Baltimore, Md., to evaluate the effect of partial pressure suits on the output of blood from the heart.

The bed is part of a ballistocardiograph apparatus that records on a graph the force and time course of the heart beat. Each time the heart forces blood out into the body there is a shock, something like the recoil of a gun. Measuring the strength of this shock gives information about the strength of the heart. (See SNL, Aug. 28, p. 130).

The shock of ejection of blood from the heart can be seen by standing on a well balanced spring scale and watching the pointer quiver.

Numerous devices, all called ballistocardiographs, have been made to measure this heart beat force. They are said, however, to have given an untrue picture because they did not take into account shock-absorbent and spring-like characteristics of the human body.

This is where the suspension bed comes in. It is suspended so delicately that it moves with each minute rebound of the body caused by ejection of blood.

It was developed as a result of studies begun in Germany by W. W. von Wittern, a physicist, and later continued at the Wright Air Development Center's Aero Medical Laboratory in Ohio.

With the aid of Capt. Carl Honig, a physician at WADC, and WADC engineers, the special light-weight bed was developed, into which were built compensations to cancel out the spring and damping qualities of the human body. Now, with these eliminated, the ballistocardiograph produces an accurate measurement of the shock action of the blood as it is ejected from the heart.

The function of the device basically is to record on a graph the acceleration given the blood as it is ejected by the heart. This acceleration, when known, makes it possible to calculate the strength and time characteristics of heart contraction, which is important in medical research and diagnosis. This has been impossible to obtain from an electrocardiograph.

The new apparatus already has been employed clinically with very promising results.

Science News Letter, September 4, 1954

## PUBLIC SAFETY

### Nation's Vets Urge More Defense Against BW

► THE AMERICAN Veterinary Medical Association at its meeting in Seattle urged more money and preparations for defense against germ warfare.

Although lay persons, especially city dwellers, are likely to think of germ warfare, or BW, in terms of human disease epidemics, veterinarians know that the nation's food supply might be cut by BW attacks on livestock, poultry and plant crops for human and animal feeding.

The AVMA's National Emergency Advisory Committee urged that the Federal Civil Defense Administration be given sufficient funds and authority to complete its program of preparing the nation against attack. It also recommended that problems relating to livestock in this program be turned over to the U.S. Department of Agriculture, which should be equipped with the necessary veterinary services.

An inventory of the amount of biological agents on hand for emergency and of the facilities for producing them, and a study to determine the need for additional state and regional laboratories to guard against possible biological warfare were also urged.

Science News Letter, September 4, 1954

## AERONAUTICS

### Four Generations Of Fighters

#### See Front Cover

► TOP FIGHTERS of the past, present and future for the United States sat for their portrait recently at Nellis Air Force Base, Nev. Circling around the 110-mile-an-hour Spad of World War I (lower left) are the North American F-86 Sabre Jet, F-51 Mustang, top propeller fighter of World War II, and the new supersonic F-100, holder of the official world's speed record of 755 miles an hour (left to right above).

Science News Letter, September 4, 1954

## TECHNOLOGY

### Machine to Show All Of Shell Egg Quality

► A MACHINE will some day do the entire job of detecting the quality of eggs in the shell, Dr. A. W. Brant of the U.S. Department of Agriculture predicts.

Mechanical methods can now determine nine of 11 major factors currently considered criteria of shell egg quality. Still to be developed are mechanical methods for measuring albumen quality and for "screening" for defects.

The nine quality factors that can now be determined by machine are egg size, shape, cracks, shell strength, air-cell size, blood, *Pseudomonas*, or green, rots, shell color and yolk color.

Mechanical methods for determining these were described by Dr. Brant and K. H. Norris, agricultural engineer of the department, at the World Poultry Conference, Edinburgh, Scotland, as follows:

Egg size is determined by weighing the eggs as they are moved by a conveyor. Egg shape determination requires only the application of known principles of electronic accepting or rejecting signals received from mechanical "feelers." Crack detection is accomplished through mechanical tapping and "listening"—an adaptation of the long known art of "clacking" eggs.

Shell strength can be determined by applying known stresses to shells and accepting those undamaged by the treatment. The worth of this method lies in its ability to salvage weak-shelled eggs that would ordinarily crack during marketing and be lost. Air-cell size is reflected with a high degree of accuracy by measuring the absorption of radio-frequency energy.

Presence of blood, presence of *Pseudomonas* rots, commonly called green rots, and shell and yolk color can be detected—and classified where necessary—by appropriate use of light transmitting, reflecting or fluorescing properties of the egg.

Science News Letter, September 4, 1954

## VETERINARY MEDICINE

### Virus Hits Brain And Nervous System

► A NEW disease threat to dogs has been discovered. It is a virus disease that attacks the brain and nervous system, and is described in *Nature* (Aug. 21).

Continuous high fever and later trembling, weakness, failure of muscular coordination, disturbed reflexes and epileptic-like convulsions are the symptoms.

The disease was discovered by Dr. James H. Whitten of the University of Sydney, Australia, in a four-month-old fox terrier. This terrier died of the disease. It had had shots against distemper one month before. Study of its body led to discovery of what Dr. Whitten believes is a new virus distinct from others that cause canine encephalitis.

Science News Letter, September 4, 1954

## ELECTRONICS

# Revolution in Electronics

A whole new concept of electronics has been made possible by a design and production system that forms ceramic wafers, like building blocks, into rugged circuits for radar.

By ALLEN LONG

► THE WHOLE concept of electronics design and production has been shaken in the last few years by the development of transistors, germanium diodes, subminiature tubes and processed circuits.

The electronics industry today truly is experiencing a new technical and industrial revolution out of which will emerge better and cheaper products for American homes.

Perhaps one of the most startling electronic developments of the 20th Century will prove to be a manufacturing process known as the "Modular Design of Electronics and the Mechanized Production of Electronics" (MDE-MPE).

Because they lacked search radar, some of America's planes sat on the ground during the Korean War. On the home scene, electronic defense plants were going full blast, but their output lagged the demand.

This highlighted a problem that had been of great concern to the Industrial Planning Division of the Navy's Bureau of Aeronautics. America's production of electronics simply could not adequately meet an emergency. In a full-scale, world-wide conflict, this could put the United States at a critical disadvantage.

The Navy joined the National Bureau of Standards in a mutual quest for a way of stepping up the production of vital electronic equipment. After years of experimenting, a whole new concept evolved. A plant was built near Arlington, Va., and the Kaiser Electronics Division of Willys Motors, Inc., was selected to operate it for the Navy.

## "Project Tinkertoy"

Scientists had found a way of "licking this bottleneck in electronics production. They nicknamed their work: "Project Tinkertoy."

Because naval electronic equipment being "Tinkertoyed," or mechanized, was classified, America's military experts stamped it "Confidential." However, eventually a need arose for spreading the word to other electronics manufacturers so they would be equipped, able and ready to shift into high-gear emergency military production should America be confronted by an aggressor.

The project was declassified in September, 1953, and the National Bureau of Standards' Technical News Bulletin carried a feature-length article on it. Inquiries poured in from England, France, Switzerland and Sweden, and at least one technical French journal ran an article on it.

The Russians have made no direct in-

quiry, but you may be sure they know a great deal about the project now. Russian scientists can recognize a good thing when they see it.

The MDE-MPE system, as it is now called, fairly sparkles with gems that have been extremely rare in other systems.

Briefly stated, a manufacturer can truck raw materials in one door of his plant and cart away finished radar circuits through the other door. He can make his own resistors, capacitors, tube sockets and coils. This frees him of dependence upon some circuit-components manufacturer who may be already swamped with orders of various priorities from other customers.

The basic unit in the modular system is a ceramic wafer  $\frac{3}{4}$ -inch square by  $\frac{1}{16}$ -inch thick. It is made of non-strategic talc, kaolin clay and barium carbonate. After

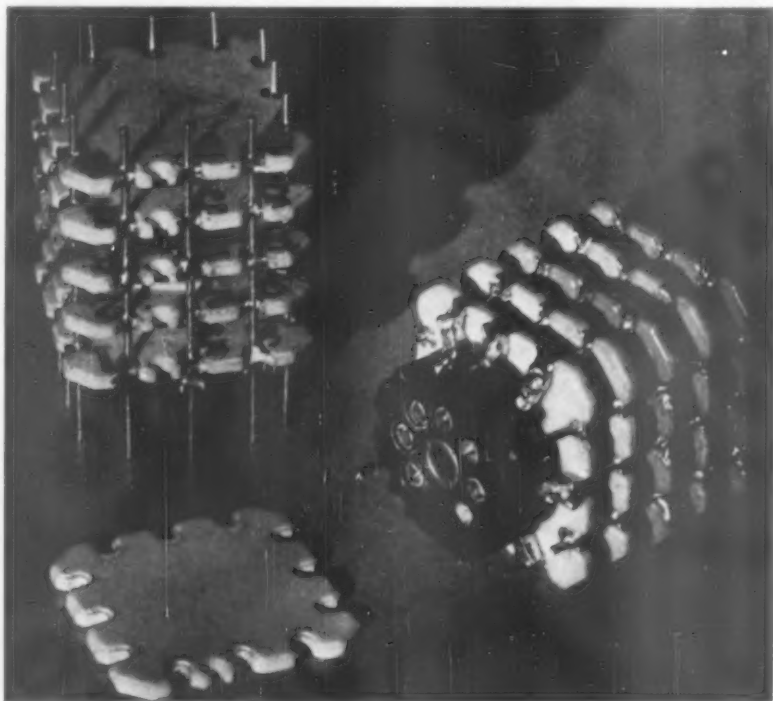
its firing stage, the ceramic wafer possesses excellent electrical characteristics.

Silver current-carrying lines are printed on the wafer to form one small section of an electronic circuit. Then tape resistors or thin titanate ceramic capacitors are bonded in place on the wafers. A selected group of wafers is fed into a machine which solders them together with 12 riser wires that join notches on the edges of the wafers. An amplifying stage for a radio or radar set is complete when a tube is plugged into the top wafer.

## Reliable Modules Made

The finished module is an inch or so tall. It resembles a miniature office building under construction, its exposed floors supported by vertical girders.

MDE-MPE equipment is reliable. Each wafer-like component is automatically checked by machine. This helps insure the proper functioning of the radar, the bomb sight or the airplane's electronic gun-control system.



**ELECTRICAL BUILDING BLOCKS**—The ceramic wafer in the foreground is the building block in the new "modular design of electronics" system. An assembled module is shown at the top. The view at the right shows the top wafer made as a seven-pin tube socket. The whole unit is an amplifying stage for electronic equipment.

The finished modules are heat-resistant. This helps solve a problem that has plagued military aviation experts. A modern plane is jammed with electronic equipment that is tucked away in every available nook and cranny. Air circulation in these places is poor and the equipment generates high heat. Glass-enclosed vacuum tubes have been known to twist and bulge because of the excessive temperature.

MDE-MPE equipment is rugged. Modules can take the battering around of rough, untrained hands. This is important in military service where conditions often make it impossible to appreciate fully the delicate sensitivity of electronic equipment. It also fortifies the equipment against severe buffeting and vibration a bomber may endure while executing its mission.

The modules are moisture-resistant. This gives them an edge over unprotected equipment in humid climates or on spray-soaked decks of Navy ships.

### Comparable Production Costs

Production costs of the MDE-MPE system have fallen to a level comparable with the costs of conventional production systems. This does not mean, however, that your next portable radio or television set will be based upon the modular system.

However, it does mean that industry is more likely to apply these new principles to civilian products fairly soon.

You, the consumer, will benefit from these latest developments pioneered by scientists who are ever seeking better ways of doing things.

There is a definite industrial trend today toward automation — machines that mind themselves, that work steadily and accurately while guided only by punched cards, magnetic tape or other control means.

The MDE-MPE system is almost entirely automatic.

### Keyed Notch Used

A keying notch is formed into one edge of each wafer to facilitate machine-handling. By twisting the wafer or flipping it over and turning it some more, machines are able to position the wafer properly so that parts are attached in the right places.

Wafers can be any of three types, or a seven- or nine-pin tube socket. When stacked like hotcakes and linked by the tiny wires, the module is completed.

Electrically, this module could be an amplifying stage so built that it could be unplugged if something goes wrong with it. A whole new assembly would be substituted for it. This would simplify repair of the electronic gear, and would help technicians service the equipment with less training.

In time of war, the armed services, who have to train thousands of technicians, thus would benefit materially from this feature.

Resistors, which limit the flow of current in a circuit, usually are cylinder-shaped. A common variety of small resistor measures about an eighth of an inch in diameter and about three-eighths of an inch long. A

wire protrudes from each end and must be soldered into the equipment.

MDE-MPE resistors, however, are flat bits of tape bonded to the ceramic base. A large square of protective tape material may cover them. They are made of a heat-resistant asbestos paper known as Quinterra, polyethylene tape, carbon black or graphite, resin, and a solvent.

A 75-foot roll of it will produce over 10,000 resistors ranging in value from 10 ohms (an ohm is the unit of resistance) to 10,000,000 ohms, depending upon the mixture used.

### Capacitors Wafer-Mounted

MDE-MPE capacitors, which store electricity and which are vital in converting a radar signal into information for the radar screen, are made in half-inch squares for wafer mounting. Compounded of a non-porous ceramic — usually of magnesium, barium, calcium and strontium titanates of high purity—they are about a fiftieth of an inch thick.

Their capacity may be varied from 10 micro-micro farads (10 billionths of a farad, the unit of capacitance) to .01 microfarads by changing the proportions of minerals used in them. Raw material batches weighing about five pounds will make 100,000 capacitors.

As labor costs are reduced by machines, raw materials costs grow in importance in the manufacturer's economy. The availability and costs of MDE-MPE production materials are believed to be two of the system's biggest selling points today, and are expected to entice more manufacturers to use the system in the near future.

A kit containing subminiature tube, ceramic capacitor, germanium diode, transistor and two ceramic modular wafers, one a resistor and the other a capacitor has been prepared by Science Service. A booklet accompanying the kit describes these important electronic circuit components.

These kits are available at 75 cents each from Science Service, 1719 N St., N.W., Washington 6, D. C. Ask for the Modern Electronics Unit.

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### VETERINARY MEDICINE

## Little Pig Can't Go To Market on Sugar

► LITTLE PIGS won't go to market or even live to stay home and eat bread and butter if they are fed sugar of the kind chemists call sucrose. However, if they get glucose, or dextrose, they do all right. The newborn pig lacks the ability to utilize sucrose or, in chemical terms, to hydrolyze the glycosidic bond of sucrose. These findings are reported by Drs. D. E. Becker, D. E. Ullrey, S. W. Terrill and R. A. Notzold of the University of Illinois, in *Science* (Aug. 27).

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Tuberculosis, in seventh place as a cause of death in the U.S., attacks 110,000 persons a year.

### VETERINARY MEDICINE

## Cattle Menaced By Polluted Water

► GUARD AGAINST water pollution and rats to protect cattle from leptospirosis, the nation's farmers and cattle raisers were warned at the American Veterinary Medical Association meeting in Seattle.

Leptospirosis is considered one of the most serious disease threats to the livestock industry today. It is caused by a spiral shaped germ related to some germs that cause human diseases.

The cattle disease is also a potential menace to humans, Dr. Herbert G. Stoener of the U.S. Department of Health, Education and Welfare, pointed out. He advised pasteurization of milk and avoidance of swimming in ponds and streams contaminated by cattle as safety measures for humans.

Cattle, he said, may be carriers of the spiral germs of the disease for some time after they have recovered from the sickness. They can act like the Typhoid Marys among humans. Healthy cattle, therefore, as well as humans, should be kept away from streams, ponds and other water sources that the leptospirosis carriers may contaminate.

Vaccines are effective only when administered to the uninfected animals in the early stage of an outbreak or when new animals are added to the herd.

The disease is usually not fatal to cattle, but may cause heavy economic losses in abortions, decreased milk production, and weight declines.

Rats and other rodents may carry the disease and swine may serve as possible reservoirs. The American Veterinary Medical Association therefore advises a rodent control program and keeping cattle and swine on separate feed lots as possible means of curbing the disease.

Science News Letter, September 4, 1954

## GOLF: Your LEFT SHOULDER makes the amazing difference!



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One of the most startling discoveries to emerge from wide research in the golf swing is that your game literally hinges on your left shoulder!

How this is so and how to use this great discovery to improve your own game beyond all expectation in a matter of short weeks is set forth in **THE GOLF SECRET** by Dr. H. A. Murray — a medical doctor, golfer, and golf researcher, who has applied his expert knowledge of anatomy in this sweeping and utterly different study of the golf swing.

His method has now been tested on a large scale and been found to yield simply astounding results! Not only do golf scores take a sudden drop, but with the new method good golf is a hundred times easier than bad — because it is **NATURAL** (not strained) golf.



# • Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

**THE BIOLOGY OF MAN**—John S. Hensill, Joel F. Gustafson, and Herman Zaiman—*Blakiston*, 440 p., illus., \$5.50. A text for college students, presenting the major principles of animal biology as they apply to man.

**INTERPRETING SOCIAL CHANGE IN AMERICA**—Norman F. Washburne—*Doubleday*, Doubleday Short Studies in Sociology, 50 p., paper, 95 cents. Change in America has been much broader than adoption of the 5-day week and development of television and the atomic bomb.

**PETROLEUM MICROBIOLOGY: An Introduction to Microbiological Petroleum Engineering**—Ernest Beerstecher Jr.—*Elsevier*, 375 p., illus., \$8.00. Describing the science of petroleum microbiology in a systematic manner and in terms meaningful to both engineers and bacteriologists.

**THE PHYSICIAN AND HIS PRACTICE**—Joseph Garland, Ed.—*Little, Brown*, 270 p., illus., \$5.00. A source book of the non-technical aspects of a medical practice, written by physicians for the young doctor just beginning his career.

**PRINCIPLES OF OCCUPATIONAL THERAPY**—Helen S. Willard and Clare S. Spackman, Eds.—*Lippincott*, 2nd ed., 376 p., illus., \$5.50. This book has been extensively revised and rewritten to keep pace with the rapid development of the profession.

**PROSPECTING WITH A COUNTER**—Robert J. Wright—*Gout. Printing Office*, revised ed., 68 p., illus., paper, 30 cents. Written by a geologist of the Atomic Energy Commission, this booklet describes the operation, maintenance and use of radiation detection instruments suitable for uranium prospecting.

**SAHARA**—Rene Lecler—*Hanover House*, 280 p., illus., \$3.95. The exploration and conquest of this hot, dry, cruel land from biblical times to the present.

**SEX IN MICROORGANISMS: A Symposium Presented on December 30, 1951 at the Philadelphia meeting of the American Association for the Advancement of Science**—D. H. Wenrich, Chairman and Ed.—*American Association for the Advancement of Science*, 362 p., illus., \$5.75. Presenting the evidence for "sex" in the principal groups of microorganisms, from the viruses through bacteria, fungi and unicellular algae to the protozoa.

**STUDIES IN SCIENTIFIC HYPNOSIS**—Jerome M. Schneck—*Nervous and Mental Disease Monographs*

*graphs*, 333 p., \$6.50. A collection of formerly published papers by the author on scientific hypnosis. He foresees a sound future for hypnosis despite "shortsighted prejudice" and "disheartening abuse."

**TEACHING RAPID AND SLOW LEARNERS IN HIGH SCHOOLS: The Status of Adaptations in Junior, Senior, and Regular High Schools Enrolling More Than 300 Pupils**—Arno Jewett and J. Dan Hull, Coordinators—*Gout. Printing Office*, Office of Education, Bulletin 1954, No. 5, 97 p., paper, 35 cents. Describing the methods used in large high schools to adapt teaching methods in different subjects for pupils who are not average.

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## BIOCHEMISTRY

# A-Bomb Protection

► **DISCOVERY OF** a protein in blood which seems to play an important part in giving a person natural immunity to germ and virus diseases is reported by Dr. Louis Pillemer and associates of Western Reserve University, Cleveland, in *Science* (Aug. 20).

This protein might even become useful medicine to save lives of some A- and H-bomb survivors.

The newly discovered blood chemical has been given the name properdin, from the Latin word *perdere*, which means to destroy.

Properdin is not the same as antibodies, another class of blood substances that give immunity to specific diseases. It is found in Fraction III of blood serum when this fraction is separated by the Deutsch method.

It acts only in conjunction with another blood substance, called complement, and magnesium. It takes part in such varied activities as destruction of bacteria and neutralization of viruses, and destroys certain red blood cells.

Properdin, normally present in human blood serum, is destroyed by irradiation. Its destruction by radiation from A-bombs may be responsible for the infection which, in spite of antibiotics, would probably kill many survivors of A- and H-bomb attacks.

Since it can be obtained in good yield from both human and cattle blood serum, it might be possible to use it to save lives of any future A- or H-bomb victims.

Recent reports by other scientists show that mice can be partly protected from irradiation by injections of fractions of blood serum, particularly Fraction III which is now shown to contain properdin.

Properdin has been found in the blood serum of rats, mice, cows, hogs, humans, rabbits, sheep and guinea pigs. Other animals have not yet been tested.

Of the warm blooded animals treated, the rat has the most, the guinea pig the least, and humans are in between. This further

## VETERINARY MEDICINE

# Fight Animal Diseases by Official Reporting System

► **ALL CASES OF** contagious animal diseases that threaten the nation's meat supply should be officially reported, Brig. Gen. J. A. McCallam, president of the American Veterinary Medical Association, told members attending its meeting in Seattle.

So-called catching diseases of humans, from anthrax to whooping cough, are regularly reported by state health officers to the Public Health Service in Washington. This helps fight epidemics by showing where and when they are starting.

The same kind of official reporting system should be instituted for the many communicable diseases of animals to help prevent their spread, Gen. McCallam believes.

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strengthens the idea that properdin is important in natural immunity.

This is the kind that enables people and other animals to resist disease without being vaccinated and even when they have not had previous contact with the disease that might have made their bodies develop antibodies to it.

Rats are known to have a lot of this natural immunity, being very resistant to disease, while guinea pigs are quite susceptible.

Associated with Dr. Pillemer in the work on properdin were Drs. Livia Blum, Irwin H. Lepow, Oscar A. Ross, Earl W. Todd, Alastair C. Wardlaw and A. R. Moritz.

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## TECHNOLOGY

# Radioactive Cesium Aids Rebuilding of Cyclotron

► **RADIOACTIVE ATOMS** of cesium are helping scientists rebuild the University of California's atom-smashing cyclotron.

Now being expanded in capacity, the cyclotron's new design requires tapered holes drilled in wedge-shaped sheets of Nitralloy steel, a special alloy steel suitable for surface hardening.

The tapered holes, 24 inches deep and a quarter inch in diameter at their bases, are being drilled by machinists at the Mare Island Naval Shipyard, Vallejo, Calif. Cooling water will flow through them.

Tolerance had to be held to one-fiftieth of an inch. Maintaining this tolerance while drilling the holes stumped the machinists until a Geiger counter was suggested.

By plunging a rod tipped with radioactive cesium into the hole and by measuring the radioactivity on both sides of the plate, the machinists could tell whether the hole was being drilled properly.

Science News Letter, September 4, 1954

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## BIOCHEMISTRY

# Particles Fight Germs

► **CHARGED PARTICLES** of calcium and magnesium are needed by the body to fight off invading disease germs.

The calcium particles carry a double positive charge. The magnesium particles are similarly charged. Cobalt, nickel and to a less extent, cadmium, manganese or zinc may substitute for the magnesium.

Third of the chemical steps involved in the body's destruction of invading germs requires no charged particles.

These findings from research by Dr. Manfred M. Mayer of Johns Hopkins University, Baltimore, have been announced by the American Cancer Society which supported his work.

Whether the findings have any bearing on cancer depends on whether body cells are so changed in becoming cancerous that they might fall into the category of foreign or invading cells and be attacked as disease germs are.

The cancer society described Dr. Mayer's findings as follows:

Very little is known about the fundamental fight the body puts up against disease. It is known that the body produces a protein, known as antibody, which may clump over the surface, possibly as a mirror image, of protein particles (or antigens)

on the surface of the invading cells. This causes the bacteria to break open, to clump together or to be precipitated in an inactive and inanimate mass of waste matter.

Another substance, called complement, also is involved. This has several components. Complement abounds in the blood serum and is needed, along with antibody, to destroy invading cells. Just what it does, however, and how it does it never has been known.

The Johns Hopkins scientists have found that complement and antibody are relatively powerless in the absence of the charged calcium and magnesium particles.

They showed this by passing complement through a resin, which depleted it of charged calcium and magnesium particles, and by adding to complement a substance called EDTA (ethylene diamine tetraacetate) which bound the elements and neutralized their charges. When charged calcium particles were added, part of the antigen-antibody reaction with complement took place; and when magnesium later was added, the reaction was completed.

Associated with Dr. Mayer in the work were Drs. Lawrence Levine, Kenneth M. Cowan and Abraham G. Osler.

Science News Letter, September 4, 1954

## • RADIO

Saturday, Sept. 11, 1954, 3:15-3:30 p.m. EDT

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. L. Whittington Gorham, secretary general, 2nd World Congress of Cardiology and 27th Annual Scientific Session of the American Heart Association, will discuss "World Cardiology." The 2nd World Congress of Cardiology will be held in Washington, Sept. 12-17.

## BIOCHEMISTRY

## Must Check Antibodies For Replaceable Organs

► **TO MAKE** possible the setting up of "skin banks" for the badly burned or the use of healthy organs to replace diseased ones, scientists will have to devise some way to check the production of antibodies in human beings.

The same sort of mechanism that helps to protect us from disease seems to prevent successful cross-grafting of skin and replacement of body parts, it appears from studies at the University of California at Los Angeles Medical School by Drs. Jack Cannon, Robert Weber and William Longmire.

Permanent successful "takes" of cross-grafted skin in chicks less than a week old have been made. However, as the chicks grow older successful "takes" are no longer possible. The grafts may take initially but soon die. Nor can the grafted skin of a permanent "take" be successfully transplanted back to the original donor after the chicks reach adulthood.

This indicates that the reaction of the body to skin from another individual is related to the mechanism by which the body "kills" foreign bodies such as bacteria. This is known as the antibody reaction.

Antibody reactions can be artificially stimulated by inoculations, such as those of typhoid and tetanus. It seems likely, the scientists suggest, that conversely they might be repressed by some artificial means.

Science News Letter, September 4, 1954

## ZOOLOGY

## Begging Burros Stop Black Hills Tourists

► **WHAT BEGGING** bears are to Yellowstone National Park, some 20 begging burros are to Custer State Park in the Black Hills of South Dakota.

The Black Hills burros are encountered by thousands of visitors annually on U. S. highway 16A not far from Mount Rushmore. They beg food from passing motorists, frequently standing in the road to stop cars. A traffic tie-up such as they cause at times is known locally as a "Jackass jam." Neither burros nor visitors have ever been injured.

Burros once carried visitors up to Harney peak lookout, but proved so stubborn they were eventually replaced by horses. At that time, the burros were freed to roam the park at will.

Science News Letter, September 4, 1954

## METEOROLOGY

# Desert Weather Control

► **GIANT WINDMILLS** can control the weather over desert and semi-arid regions so that useful crops could be grown in these now-wasted areas, that comprise such a large part of the earth's land surface.

The 150-foot windmill blades could also solve the Los Angeles smog problem, Dr. Werner Spilger of Holloman Air Force Base, Alamogordo, N. Mex., suggested in a paper read to the American Meteorological Society meeting in Rochester, N. Y., by Col. John Hemen of the U. S. Air Force.

Dr. Spilger has a patent application pending on his weather control method. The huge windmill, with its blade swirling 150 feet above the ground, would be used to create artificial "thermal updrafts," or vertical streams of warm air.

The device would draw air from a radius of about five miles, Dr. Spilger estimates, at a rate of 65 to 90 miles an hour. The result would be a funnel of fast-moving air similar to that found in tornadoes or dust devils.

The thermal updraft can be regulated by changing the angle at which the windmill blades operate or by varying the power of the 500 horsepower motor he suggests should be used to rotate the shaft in desert areas.

About 10 or 15 such windmills located in the mountains could affect the weather

for most of the state of New Mexico, Dr. Spilger believes.

Once such a system has been set up, he said, "we could win useful work with it." One giant windmill, Dr. Spilger has calculated, could tap 50,000 kilowatts of power from the kinetic energy of the updraft.

Dr. Spilger said that several thousand flight tests with gliders have sampled the atmosphere to get some idea of its structure, and his method is based on findings from these flights.

No full-scale versions of the windmill have been built yet, but Dr. Spilger has tested his method with models in his basement laboratory.

By using the hills that surround Los Angeles, Dr. Spilger points out, "it is possible to solve the city's smog problem." In that area, the windmills would be used to destroy the "inversion," which occurs when temperature increases with height, rather than falling off at higher levels as is the usual case. Such warmer air up high blankets the air below, preventing its escape.

Dr. Spilger estimates that ten windmills, each powered by a 5,000 horsepower motor, would do the job of dissipating the inversion layer and relieving Los Angeles of its smog.

Science News Letter, September 4, 1954

## INVENTION

## Patent Weighing Device For Use in Wind Tunnels

► AN ELECTROMAGNETIC weighing device to measure the forces exerted on airplane models in wind tunnels has received patent number 2,685,200.

Its inventors, Hiram G. Slottow of Baltimore, Md., and Turner L. Smith of Havre de Grace, Md., assigned their patent to the government as represented by the Secretary of the Army. The device, they claim, combines the excellent dynamic properties of a mechanical spring scale and the accuracy of a beam balance, the two instruments previously used for such wind tunnel measurements.

The new instrument can detect forces up to 40 pounds at a "stiffness" of over 100,000 pounds per square inch. The forces are measured by the electric current generated in the system, such current being proportional to the velocity and displacement of a shaft.

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## Questions

BIOCHEMISTRY—What is properdin? p. 156.

□ □ □

ELECTRONICS—What was "Project Tinkertoy"? p. 154.

□ □ □

ENTOMOLOGY—How do flies become DDT-resistant? p. 152.

□ □ □

NEUROPHYSIOLOGY—Where in the brain is the seat of the emotions? p. 150.

□ □ □

PHYSICS—How do A-bombs affect radio-carbon dating? p. 148.

□ □ □

VETERINARY MEDICINE—How does polluted water menace cattle health? p. 155.

□ □ □

Photographs: Cover, North American Aviation, Inc.; p. 147, General Electric Company; p. 149, Sperry Gyroscope Company; p. 151, Bell Telephone Laboratories; p. 154, National Bureau of Standards; p. 160, Bakelite Company.

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## ZOOLOGY

## NATURE RAMBLINGS



### Gathering Into Barns

► AT HARVEST time, we are apt to become a bit satisfied with ourselves, regarding man as the only creature that looks toward the future and seeks security against its chances by laying in supplies.

Yet a moment's looking about will dispel this mistaken pride, for the world is full of other beings that also gather into barns.

Rodents as a class offer numerous interesting examples of this hoarding habit. Squirrels lay up stores of nuts and grain, beavers stock their ponds with sticks bearing tasty bark, certain wild mice lay by quantities of seeds, and the pika or little chief hare of the Rocky Mountains cures hay and packs it away in his rock-crevice home.

## VETERINARY MEDICINE

## Ants Threaten Cattle

► ANTS ARE serious enemies of cattle, a committee of the American Veterinary Medical Association charged at the association's meeting in Seattle.

The ants play host to the lancet fluke, one of the worm parasites that kills cattle. Workers found almost a third of the ants collected at two different locations in New York state to be infected with this fluke.

The cottontail rabbit, the committee reported, can also play host to this cattle destroying fluke.

The seriousness of the cattle parasite situation was shown by reports that some cows were found harboring over a million parasites in their stomachs.

About five percent of 1,900 animals on 10 Georgia farms were killed off by such parasites in slightly over one year.

Besides the ant threat, veterinarians heard of an entirely new disease that kills cattle and for which no remedy has yet been discovered. Known as "mucosal disease," it has already been found in 73 cattle herds in Iowa, and the death rate from it is 90%. Dr. K. F. Ramsey of Iowa State College reported.

Birds are not often thought of as hoarders; indeed, they are cited in the New Testament parable as among the creatures that take no thought for the morrow. Yet a few of them do store food.

The habit of the shrike or butcher-bird, of hanging his victims on thorns or the prongs of barbed-wire fences, is not a torturer's trick, as has been widely believed, but only a bit of packing-plant technique. California woodpeckers wedge acorns into cracks, or into holes of their own drilling, and come back later to consume them.

Often this hoarding habit runs away with itself. The bird or beast goes on storing and storing, in a veritable orgy of acquisitiveness, long after reasonable provision has been made for the future. Such creatures pass the thrift line and become mere hoarders, getting merely for the sake of getting, even losing track of all they have gathered.

An industrious California woodpecker, for example, will hammer away tens of thousands of acorns, and even stick smooth pebbles into his storage-crevices, and leave them there for years unused, while he just as assiduously stores the next season's crop.

Such excess of storing activity invites its own penalty. Bees are notorious for the way they will fill to overflowing whatever cavity they may chance to be inhabiting.

Beekeepers know this and pile super on super, letting them fill all the frames. Then they take away almost all the honey, leaving only enough to carry the bees through to the beginning of another season. And the poor, silly, exploited insects do not seem to have the least idea of what is happening to them.

Science News Letter, September 4, 1954

Winter and early spring, especially February and March, are the worst times for the disease.

An age-old disease of cattle, bloat, still causes great losses to farmers, Dr. R. E. Nichols of Madison, Wis., reported. Wisconsin farmers alone lose more than \$2,000,000 every year to this disease, for which scientists have yet to find the true cause and a sure remedy.

Bright spot in the gloomy livestock scene was the report of good results with the new vaccine against blue tongue of sheep. More than 90% of sheep given the new vaccine showed little or no reaction to the blue tongue virus when subjected to it six weeks after vaccination in trials in California and other western states. By contrast, more than 70% of unvaccinated animals showed severe to moderate reactions.

Science News Letter, September 4, 1954

The American chestnut tree, victim of blight for 50 years, is gradually being replaced by a new resistant hybrid, a cross between the original strain and an oriental species.

# What General Electric people are saying . . .

## F. K. McCUNE

*Mr. McCune is General Manager, Atomic Products Division*

" . . . We at General Electric believe that electric companies will be owning and operating a number of atomic power plants within the next ten years.

Second, we believe some of these will be full-scale and, what is most important, they will generate electricity at competitive costs, possibly within five, certainly within ten, years.

Third, we believe that this will be accomplished without Government subsidy for production plant construction or operation, and that Government-supplied fuel will be priced at cost-of-production levels.

Fourth, we believe that two nuclear reactors best suited for earliest and most effective competition with conventional fuel plants in this country are (a) the light water-moderated and cooled boiling reactor, and (b) the graphite-moderated water cooled reactor. These we think hold greatest promise in the

years just ahead.

In saying these production plants will operate without Government subsidy, I do not wish to detract from the immeasurable significance of knowledge developed through A.E.C. contracts. Of course, the Government's large expenditures for research and development of plutonium production reactors, mobile power reactors, and other power reactors forms the base from which private industry can proceed. But, the important thing here is that we believe production size atomic power plants can be made economic. They will stand on their own feet. They may sell products to the Government. They will certainly buy nuclear fuel from the Government. But, trading with the Government need not be a subsidy."

*Atomic Industrial Forum Panel  
Washington, D. C.*

Copies of Mr. McCune's complete talk may be obtained by writing to Dept. Q-2-119, General Electric Company, Schenectady 5, N. Y.

## K. R. GEISER

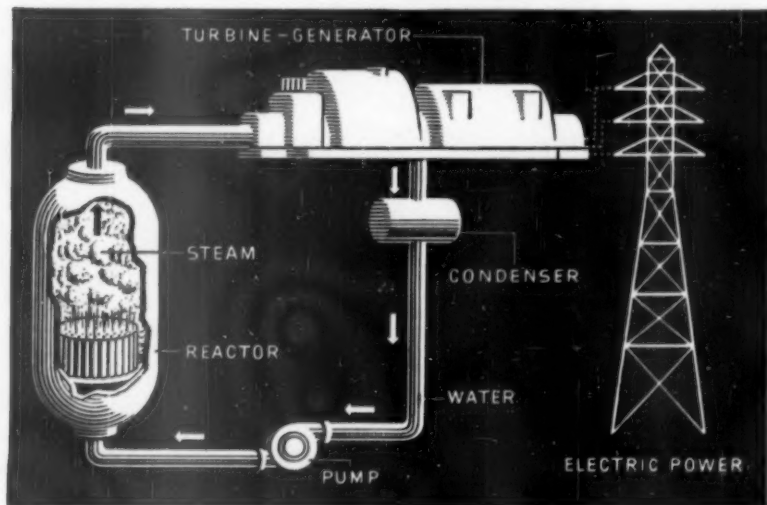
*Mr. Geiser is Supervisor of Engineering—Computer Unit, General Engineering Laboratory.*

" . . . There are three broad areas of manufacturing—manual, mechanization, and automation. In the manual area, physical effort is used to perform an operation by the use of hands or hand tools. In the mechanization area, manually operated power-driven machines, with varying degrees of controls, are used to perform one or more operations. Progressing into the automation area, we find automatic machines which are integrated with transfer devices to perform a series of continuous automatic operations. Here you see how industry can continually upgrade the manual operation into the mechanization area by replacing the hand tool with the machine; and then by adding transfer equipment we progress to the automation area. Please note that manpower will always be required. However, there will undoubtedly be fewer men as operations are automated and the emphasis will shift from the manual skills to the mental skills for both the productive and the maintenance worker.

Man has always devoted much of his effort to finding ways and means to accomplish or circumvent the arduous and laborious tasks, especially those not requiring his full ability as a human being. There still exist in industry today many tedious, time-consuming, laborious or simple discrimination jobs which often lack mental stimulus for the people who must perform them. It does not require the full complexity of the human mind and body to carry tote boxes from one machine to the next nor to load parts in a lathe, nor to tighten bolts and solder wires in building, for instance, automobiles or radios.

As surely as man lives and thinks and strives for a better way of life, these things will be replaced.

*G.E. Engineering Specialist*



**BOILING WATER REACTOR**, of type developed by the A.E.C.'s Argonne National Laboratory diagrammed above, promises electric power at 6.7 mills/kwhr (as compared with 4.5 to 8 mills/kwhr in conventional plants).

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# • New Machines and Gadgets •

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 742. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

❁ **MULTI-PURPOSE SAW** functions as saw, ruler, level, plumb, and inside and outside squares. The upper edge of the saw's steel blade is etched with two feet of ruler markings, and its butyrate plastic handle holds a level and a plumb. Handle and blade are bolted together so as to form both inside and outside squares.

Science News Letter, September 4, 1954

❁ **SILICONE NIPPLES** for baby's bottles cost more than rubber nipples, but can take twice as much boiling without losing their shape or softening. The holes in these durable nipples do not clog easily even after long use.

Science News Letter, September 4, 1954

❁ **CHILD'S ROADSTER** boasts such advance features as a reinforced plastic body, half-circle steering wheel and gold trim. The sports car, which is six and one-half feet long and only 18 inches high, seats two and has adjustable bicycle-type pedals.

Science News Letter, September 4, 1954

❁ **SPONGE CAP** absorbs perspiration, or, when worn damp, cools the head as its moisture evaporates. The cap can also be chilled in the refrigerator and used as ice pack or cold compress.

Science News Letter, September 4, 1954



❁ **BABY BATHTUB**, without legs, attaches to inconspicuous hooks screwed into wall at a convenient height near a water outlet, as shown in the photograph. Made of flexible plastic on a rigid frame, the tub folds for compact storage when not in use. The tub's cover provides a flat surface for drying or powdering the baby, and a hose sealed to the tub's bottom fills and empties the tub easily.

Science News Letter, September 4, 1954

❁ **HAND PRINTER** for individual depositors endorses checks for deposit by mail and prints user's name and address on envelopes and papers. Available only through banks, the lightweight plastic printer is shaped like a curved desk blotter and has a rubber stamp at each end of the unit.

Science News Letter, September 4, 1954

❁ **AUTOMATIC PEELER** pares potatoes and hard fruit quickly and simply. The gadget's shaft, on which the potato is speared, is turned with a hand crank, scraping the potato against a blade which removes the vegetable's skin in one continuous paring. Made in Germany, the peeler is all metal.

Science News Letter, September 4, 1954

❁ **NOSE MASK** for the administration of oxygen and other gases is molded of butyrate plastic to conform to normal facial contours. The oxygen concentration breathed is controlled by the oxygen flow into the attached latex bag and by adjustable nose vents which let in outside air. The mask and bag assembly can be washed with soap and water.

Science News Letter, September 4, 1954

## Do You Know?

The heaviest flying bird in North America is the trumpeter swan, which has a maximum known weight of 40 pounds.

A dragonfly from the age of coal formation, found in France, measured more than two feet across its outspread wings.

In a year's time, the offspring from only six moths can eat the weight of a baby grand piano.

If temperatures stay below 50 degrees, tomatoes will remain green no matter how ripe they may be.

The tree toad can change its color to blend with tree bark or the bright green of new leaves.

A medical doctor has designed a playpen pad with knobs to give infants a soft, grasping surface for development of toe and foot muscles.

Cities in which adults have completed from 11 to 12 years of school have 20% higher retail sales per capita annually than cities whose adults have completed just eight to nine years.

## Gadget Bulletin

### AMERICA'S PREMIER LISTING OF NEW MACHINES AND GADGETS

The GADGET BULLETIN is a post card with names and addresses of manufacturers and inventors of the products described on this page every week.

Issued weekly to correspond with this Science News Letter column, each GADGET BULLETIN has a number to correspond with the number listed at the top of the column.

If you wish this Bulletin sent to you every week so that you can get information quickly on New Machines and Gadgets, send us \$1.50 for a one year subscription (52 cards for quick reference and easy filing).

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